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WASHINGTON, DC 20044-4300

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| EXAMINER |
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PEREIRO, JORGE ANDRES

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| ART UNIT | PAPER NUMBER |
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3749

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| MAIL DATE | DELIVERY MODE |
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05/28/2008

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

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|------------------------------|-------------------------------|-------------------------------|--|
| Office Action Summary | Application No. 10/586,898 | Applicant(s) HAECKH ET AL. | |
| | Examiner JORGE PEREIRO | Art Unit 3749 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period **will** apply and **will** expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply **will**, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 18-38 is/are pending in the application.
 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 18-38 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 07/21/2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
 a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/21/2006</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Drawings

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the means to achieve contra-rotating swirl flows must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 18-34 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
4. In re claims 18-34 use of the term “and/or” is confusing and renders the claim indefinite, particularly when the term is used multiple times throughout the claim.

Claim Rejections - 35 USC § 101

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 24-33 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
7. Claims 24-33 provide for the use of an externally mixing burner, but, since the claim does not set forth any steps involved in the method/process, it is unclear what method/process applicant is intending to encompass. A claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced.

Claims 24-33 are rejected under 35 U.S.C. 101 because the claimed recitation of a use, without setting forth any steps involved in the process, results in an improper definition of a process, i.e., results in a claim which is not a proper process claim under 35 U.S.C. 101. See for example *Ex parte Dunki*, 153 USPQ 678 (Bd.App. 1967) and *Clinical Products, Ltd. v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C. 1966).

Claim Rejections - 35 USC § 102

8. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

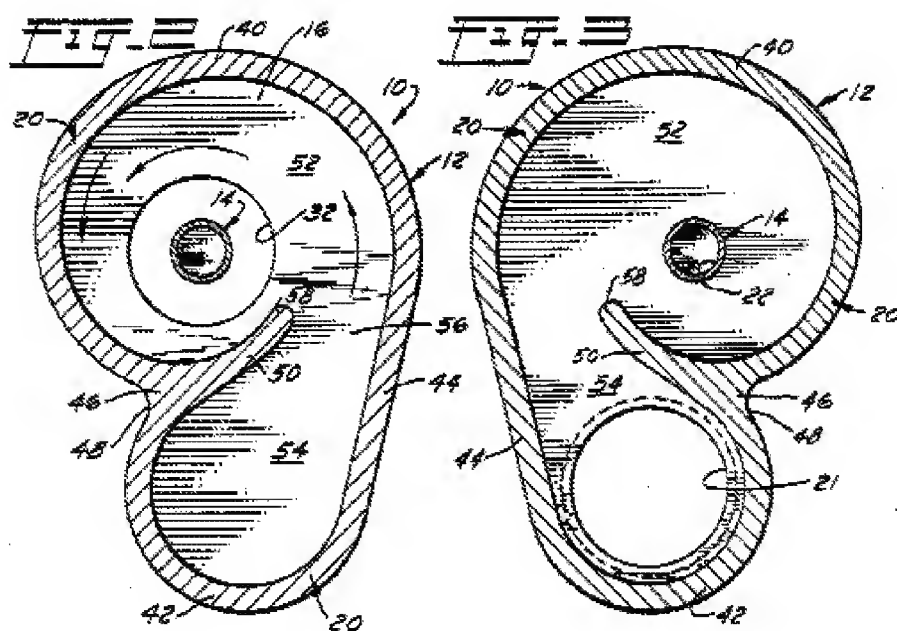
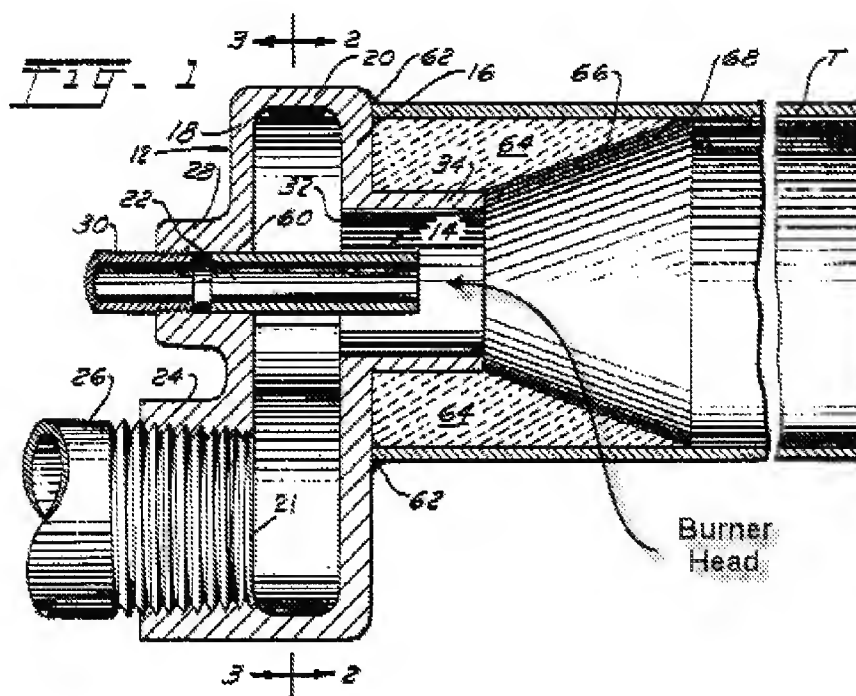
(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9. Claims 18, 22-24, 26, and 31, 34-35, and 37 are rejected under 35 U.S.C. 102(b) as being anticipated by US Patent 3,240,433 to Keating ("Keating").

10. In re claim 18, with reference to figures 1-3 below, Keating discloses an externally mixing burner (10) having a burner head (see figure 1 below), at least one combustion gas tube (14) and at least one tube for an oxygen-containing gas (24), wherein the burner head has outlet openings out of the combustion gas tube and out of the tube for the oxygen-containing gas (see figure 1 below), wherein gas inlet lines (30, 26) are provided for a combustion gas and for the oxygen-containing gas, each being connected to a source for combustion gas and/or for oxygen-containing gas (inherent), respectively, and wherein at least one gas inlet line (26) opens eccentrically into a swirl

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chamber (52) which is arranged between the gas inlet line and the combustion gas tube and/or between the gas inlet line and the tube for oxygen-containing gas (34).



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11. In re claim 22, with reference to figures 1 and 2 above, Keating discloses wherein the swirl chamber (52) has a circular cross-section in a section perpendicular to a longitudinal axis of the combustion gas tube (14).

12. In re claim 23, reference to figures 1 and 2 above, Keating discloses wherein the gas inlet line (26) opens tangentially (56) into the swirl chamber (52).

13. In re claims 24, 26, and 31 under the principles of inherency, if a prior art device (with reference to Keating), in its normal and usual operation, would necessarily perform the method claimed, then the method claimed will be considered to be anticipated by the prior art device. When the prior art device is the same as a device described in the specification for carrying out the claimed method, it can be assumed the device will inherently perform the claimed process. In re King, 801 F.2d 1324, 231 USPQ 136 (Fed. Cir. 1986). MPEP 2112.02

14. In re claim 34, the examiner takes official notice that burners of the type disclosed in Keating are inherently capable of melting various metals.

15. In re claim 35, with reference to figures 1-3 above, Keating discloses a burner (10), comprising: a combustion gas tube (14); a first gas inlet line (30) coupled to the combustion gas tube; an oxygen-containing gas tube(34); a second gas inlet line (26) coupled to the oxygen-containing gas tube; and a swirl chamber (52), wherein the swirl chamber is disposed between either the first gas inlet line and the combustion gas tube or between the second gas inlet line and the oxygen-containing gas tube.

16. In re claim 37, with reference to figures 1-3 above, Keating discloses a method for operating a burner (10), comprising the steps of: controlling a flow of a combustion

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gas (via gas supply line 30) to a combustion gas tube (14); controlling a flow of an oxygen-containing gas (via gas supply line 26) to an oxygen-containing gas tube (24); swirling the combustion gas or the oxygen-containing gas in a swirl chamber (52); and supplying the combustion gas and the oxygen-containing gas to the burner (inherent).

Claim Rejections - 35 USC § 103

17. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

18. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

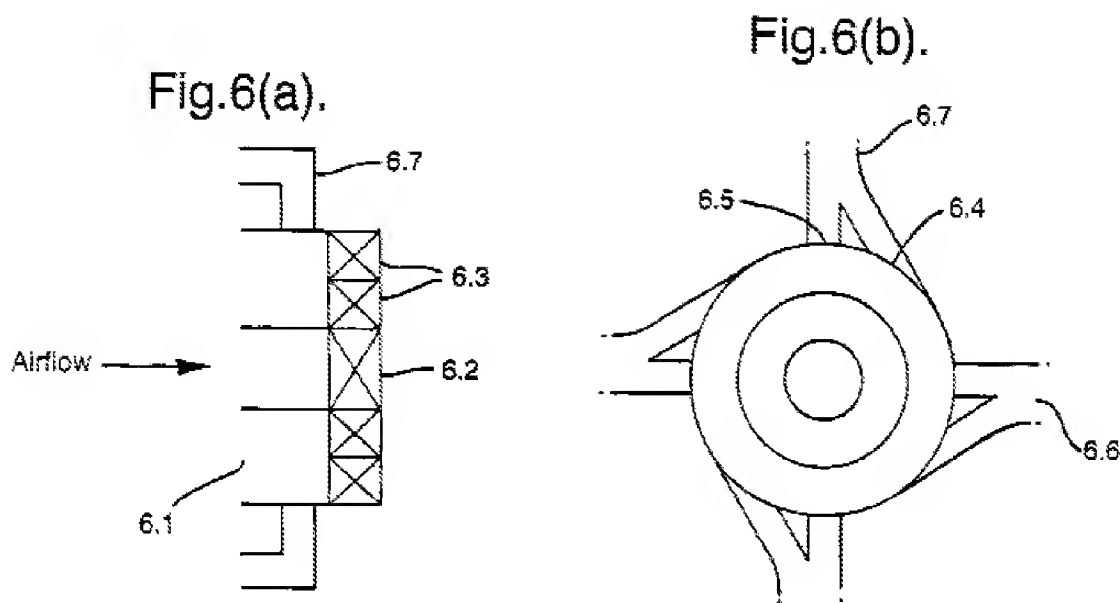
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consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claims 19-21, 30, 32-33, 36, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keating in view of US Patent 6,474,569 to Brundish et al. ("Brundish").

21. In re claim 19, Keating discloses all of the claim limitations but fails to disclose wherein at least one of the gas inlet lines is divided into two lines upstream of the swirl chamber, wherein one of these lines opens eccentrically into the swirl chamber and the other of these lines opens directly into the combustion gas tube and/or into the tube for oxygen-containing gas.

22. Nonetheless, with reference to figures 6(a) and 6(b) below, Brundish discloses a fuel injector including an air flow conduit (6.1), a combustion fuel flow conduit (not shown) and swirlers (6.2, 6.3) wherein at least one of the gas inlet lines (6.7) is divided into two lines (6.4, 6.5) upstream of a swirl chamber (6.3), wherein one of these lines (6.5) opens directly into the combustion gas tube and/or into the tube for oxygen-containing gas.



23. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to combine the teachings of Keating and Brundish by having at least one of the gas inlet lines divided into two lines upstream of the swirl chamber, wherein one of these lines opens directly into the combustion gas tube and/or into the tube for oxygen-containing gas as taught by Brundish and the other opens eccentrically into the swirl chamber as disclosed in Keating, since Brundish states that such a modification would allow for varying the degree of flow resistance and thereby affect the flow rate of the gas and the resultant combustion flame characteristics. (See Brundish, column 6, lines 24-30).

24. In re claim 20, Keating discloses all of the claim limitations but fails to disclose wherein valves are provided in the gas inlet lines, in particular valves being provided in a part of the gas inlet lines in which at least one gas inlet line is divided into two lines,

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and wherein a control unit or regulating unit controls or regulates, respectively, a degree of opening of the valves such that a shape of a flame of the burner is adjustable.

25. Nonetheless, Brundish discloses the use of a valve arrangement whereby flow can be selectively diverted into one of a plurality of subconduits (see column 5, lines 16-22 and column 7, lines 24-35).

26. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Keating to have valves provided in the gas inlet lines, in particular valves being provided in a part of the gas inlet lines in which at least one gas inlet line is divided into two lines, and wherein a control unit or regulating unit controls or regulates, respectively, a degree of opening of the valves such that a shape of a flame of the burner is adjustable as taught by Brundish since such a modification would allow for varying the degree of flow resistance and thereby affect the flow rate of the gas and the resultant combustion flame characteristics. (See Brundish, column 4, line 61 through column 5, line 22 and column 6, lines 24-30).

27. In re claim 21, Keating in view of Brundish discloses all of the claim limitations but fails to disclose wherein the valves are solenoid valves.

28. However, it would have been an obvious matter of design choice to select solenoid valves, since applicant has not disclosed that said solenoid valves solve any stated problem or are for any particular purpose and it appears that the invention would perform equally well with other types of valves and Applicant's own disclosure alludes to such alternatives.

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29. In re claim 30, Keating discloses all of the claim limitations except for wherein the swirl flow is impressed upon a flow of the combustion gas.

30. Nonetheless, Brundish discloses wherein a swirl flow is impressed upon a flow of a combustion gas (see column 4, line 49).

31. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Keating to have a swirl flow impressed upon both a flow of a combustion gas as well as a flow of oxidant as taught by Brundish since imparting a swirl flow to both the combustion gas and the oxygen-containing gas was well known in the art and such a modification would further influence the degree of air and fuel mixing and therefore affect the resulting combustion pattern (see column 4, lines 53-60).

32. In re claim 32, Keating discloses all of the claim limitations except for where co-rotating swirl flows are impressed upon a flow of the combustion gas and a flow of the oxygen-containing gas.

33. Nonetheless, Brundish discloses wherein a co-rotating swirl flow is impressed upon both a flow of a combustion gas and a flow of the oxygen-containing gas (see column 4, lines 45-60). (See also, column 6, lines 31-33).

34. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Keating to have a co-rotating swirl flow impressed upon both a flow of a combustion gas and a flow of the oxygen-containing gas as taught by Brundish since such a modification would influence the degree of air and fuel mixing and therefore affect the resulting combustion pattern.

35. In re claim 33, Keating discloses all of the claim limitations except for where contra-rotating swirl flows are impressed upon a flow of the combustion gas and a flow of the oxygen-containing gas.

36. Nonetheless, Brundish discloses wherein a contra-rotating swirl flow is impressed upon both a flow of a combustion gas and a flow of the oxygen-containing gas (see column 6, lines 31-33).

37. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Keating to have a contra-rotating swirl flow impressed upon both a flow of a combustion gas and a flow of the oxygen-containing gas as taught by Brundish since such a modification would influence the degree of air and fuel mixing and therefore affect the resulting combustion pattern.

38. In re claim 36, Keating discloses a first gas inlet line (30) coupled to the combustion gas tube (14) but fails to disclose wherein the first gas inlet line includes a first and second portion where the first portion couples to the combustion gas tube and the second portion couples to the swirl chamber. Keating also discloses a second gas inlet line (26) coupled to a swirl chamber (52) disposed between the second gas inlet line and the oxygen-containing gas tube (34) but fails to disclose wherein the second gas inlet line includes a first and second portion, with the first portion coupled to the oxygen-containing gas tube and the second portion coupled to a second swirl chamber. Keating also fails to disclose wherein a flow of gas is controlled from the first and second portions of the first and second gas inlet lines.

39. Nonetheless, with reference to figures 6(a) and 6(b) of Brundish above, Brundish discloses gas inlet lines that split into a first and a second portion that couple to the gas tube and have control means (see column 5, lines 16-22 and column 7, lines 24-35).

40. Accordingly, where a claimed improvement on a device or apparatus is no more than "the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for improvement," the claim is unpatentable under 35 U.S.C. 103(a). *Ex Parte Smith*, 83 USPQ.2d 1509, 1518-19 (BPAI, 2007) (citing *KSR v. Teleflex*, 127 S.Ct. 1727, 1740, 82 USPQ2d 1385, 1396 (2007)). Applicant claims a combination that only unites old elements with no change in the respective functions of those old elements, and the combination of those elements yields predictable results; absent evidence that the modifications necessary to effect the combination of elements is uniquely challenging or difficult for one of ordinary skill in the art, the claim is unpatentable as obvious under 35 U.S.C. 103(a). *Ex Parte Smith*, 83 USPQ.2d at 1518-19 (BPAI, 2007) (citing *KSR*, 127 S.Ct. at 1740, 82 USPQ2d at 1396. Accordingly, since the applicant[s] have submitted no persuasive evidence that the combination of the above elements is uniquely challenging or difficult for one of ordinary skill in the art, the claim is unpatentable as obvious under 35 U.S.C. 103(a) because it is no more than the predictable use of prior art elements according to their established functions resulting in the simple substitution of one known element for another or the mere application of a known technique to a piece of prior art ready for improvement.

41. It would have been obvious to one having ordinary skill in the art at the time the invention was made to have combined the burner as disclosed in Keating with the

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multiple swirl chambers and controlled split gas inlet lines as disclosed by Brundish.

Keating teaches gas inlet lines coupled directly to gas tubes and gas inlet lines coupled to swirl chambers disposed between the respective gas tube and the gas inlet. Brundish teaches gas inlet lines that split into a first portion and a second portion with flow control means and also teaches the use of multiple swirl chambers. All the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination would have yielded predictable results to one of ordinary skill in the art at the time the invention was made, namely the ability to vary and influence combustion flame characteristics.

42. In re claim 38, Keating discloses all of the claim limitations but fails to disclose wherein the steps of controlling the flow of the combustion gas and the oxygen-containing gas include the step of operating a valve.

43. Nonetheless, Brundish discloses controlling the flow of combustion gas and the oxygen-containing gas by operating a valve (see column 5, lines 16-22 and column 7, lines 24-35).

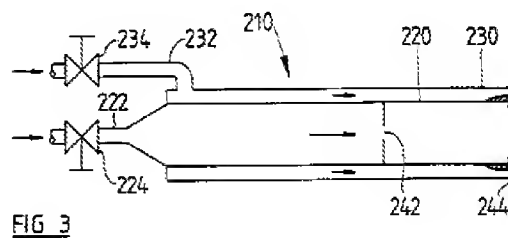
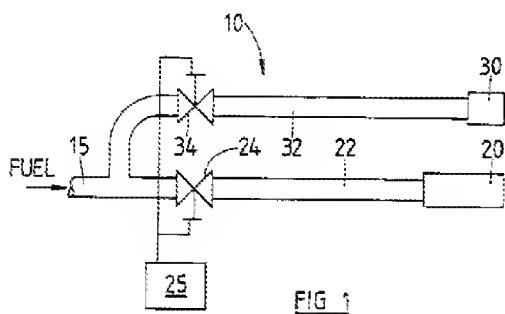
44. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the burner in Keating wherein the steps of controlling the flow of the combustion gas and the oxygen-containing gas included the step of operating a valve.

45. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Keating in view of US Patent 5,769,624 to Luxton et al. ("Luxton").

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46. In re claim 25, Keating discloses all of the claim limitations except for wherein a quantity of combustion gas and oxygen-containing gas supplied to the burner per unit of time through the swirl chamber and without the swirl chamber is controlled and/or regulated, wherein the combustion gas and the oxygen-containing gas are sent through valves wherein a degree of opening of the valves is controlled or regulated such that the burner produces a flame having a desired shape which is adjustable via a control and/or regulating unit.

47. Nonetheless, with reference to figures 1 and 3 below, Luxton discloses a burner configuration including means to control the proportions of fuel flow wherein a quantity of combustion gas and oxygen-containing gas supplied to the burner per unit of time is controlled and/or regulated, wherein the combustion gas and the oxygen-containing gas are sent through valves (224, 234) wherein a degree of opening of the valves is controlled or regulated such that the burner produces a flame having a desired shape which is adjustable via a control and/or regulating unit (25). (See column 3, lines 45-50 and column 4, lines 30-52).



48. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Keating in view of Luxton to have a quantity

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of combustion gas and oxygen-containing gas supplied to the burner per unit of time through the swirl chamber and without the swirl chamber controlled and/or regulated, wherein the combustion gas and the oxygen-containing gas are sent through valves wherein a degree of opening of the valves is controlled or regulated such that the burner produces a flame having a desired shape which is adjustable via a control and/or regulating unit since such a modification would allow for tailoring the burner flame characteristics to the particular application (see Luxton, column 2, lines 33-37).

49. Claims 27-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Keating in view of US Patent Application Publication 2002/0187447 to Sirignano et al. ("Sirignano").

50. In re claim 27, Keating discloses all of the claim limitations except for wherein the oxygen-containing gas is oxygen-enriched air.

51. Nonetheless, Sirignano discloses a combustor wherein the oxygen-containing gas is oxygen-enriched air (see page 3, paragraph [0029]).

52. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the oxygen containing gas in Keating to oxygen-enriched air as taught by Sirignano since such a modification would regulate combustion flame characteristics, in terms of efficiency, temperature and pollutant emission levels.

53. In re claim 28, Keating discloses all of the claim limitations except for wherein the oxygen-containing gas is a gas having an oxygen content greater than an oxygen content of air.

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54. Nonetheless, Sirignano discloses a combustor wherein the oxygen-containing gas is a gas having an oxygen content greater than an oxygen content of air (see page 3, paragraph [0029]).

55. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the oxygen containing gas in Keating to an oxygen content greater than the oxygen content of air as taught by Sirignano since such a modification would regulate combustion flame characteristics, in terms of efficiency, temperature and pollutant emission levels.

56. In re claim 29, Keating discloses all of the claim limitations except for wherein the oxygen- containing gas is a gas having an oxygen content greater than 70 % by volume.

57. Nonetheless, Sirignano discloses a combustor wherein the oxygen- containing gas is a gas having an oxygen content greater than 70 % by volume (see page 3, paragraph [0029]).

58. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the oxygen containing gas in Keating to an oxygen-containing gas having an oxygen content greater than 70 % by volume as taught by Sirignano since such a modification would regulate combustion flame characteristics, in terms of efficiency, temperature and pollutant emission levels.

Conclusion

59. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US 5968378 A to Jensen discloses a vortex combustion system. US 5813846 A to Newby et al. discloses a burner. US 5713206 A to McWhirter et al. discloses a combustor. US 5707226 A to Bogtstra discloses a burner. US 5618173 A to Ruhl et al. discloses a burner. US 5470224 A to Bortz discloses a two stage burner. US 5449286 A to Snyder et al. discloses a combustion method. US 5411394 A to Beer et al. discloses a burner. US 5277578 A to Ratnani et al. discloses a gas burner. US 5240404 A to Hemsath et al. discloses a burner. US 5211705 A Hagar discloses an apparatus, method, and arrangement for combustion. US 4988287 A to Stegelman discloses a combustion apparatus and method. US 4879959 A to Korenberg discloses a swirl combustion apparatus. US 4845940 A to Beer discloses a combustor. US 4565137 A to Wright discloses a burner. US 4398827 A to Dietrich discloses a swirl mixing device. US 4218426 A to Dahmen discloses a method and apparatus for combustion. US 4004789 A to Belas et al. discloses a tunnelized burner. US 3758090 A to Shimotsuma et al. discloses a combustion apparatus. US 3726634 A to Thomson et al. discloses a burner. US 3476494 A to Buchanan et al. discloses a vortex burner.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JORGE PEREIRO whose telephone number is (571) 270-3932. The examiner can normally be reached on Mon.-Fri. 9:00 am - 4:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Steve McAllister can be reached on 571-272-6785. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jorge Pereiro
Examiner
Art Unit 3749

/Steven B. McAllister/
Supervisory Patent Examiner, Art Unit 3749